

CUBA. *F. Rugel 235* (GH); **Pinar del Rio:** Galafre, *Britton and Cowell 9826* (GH); Las Guaaimas, *O'Donovan 4687* (GH); Santa Catarine, *C. Wright*, Feb. 1860 (GH); "in Cuba Orientali". *C. Wright 1562* (GH). DOMINICAN REPUBLIC: Pontezuela, *Jiménez 2565* (US); Constanza, *Türckheim 3031* (GH, US); La Estancia, *Ekman 12124* (A, US); La Cumbre, *Raunkier 1084* (US). PUERTO RICO: Cabo-Rojo, *Sintenis 699* (GH); Adjuntas, *Sintenis 4033* (US); Añasco, *Sintenis 5625* (GH). — GRAY HERBARIUM OF HARVARD UNIVERSITY.

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A RE-EVALUATION OF THE GENERIC STATUS OF ASCYRUM AND CROOKEA (GUTTIFERAE)

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Recent intensive studies of the floral anatomy and taxonomy of *Hypericum* and the segregates *Ascyrum* and *Crookea* have led to a re-evaluation of the generic status of these groups. A general review and study of the floral anatomy of *Hypericum* and related genera by Robson (1956) indicates that the species belonging to *Ascyrum*, *Crookea* and the sections *Myriandra* and *Brathydium* of *Hypericum* are closely related to each other. Recent studies by Adams (1959) in the taxonomy of these species appear to confirm Robson's idea that they form a very natural group. In the following discussion we will present evidence supporting the

reduction of the genera *Ascyrum* and *Crookea* to the more inclusive genus *Hypericum*.

Financial support of the senior author's studies in the taxonomy of *Hypericum* was provided by the following sources: the Fernald Fund for Study in Systematic Botany at Harvard University, established by Mr. F. W. Hunnewell of Wellesley, Massachusetts; a National Institute of Health grant-in-aid through the Department of Biology, Harvard University; and a research grant (RG-6305) to Dr. R. K. Godfrey of Florida State University from the Division of General Medical Studies, Public Health Service.

Ascyrum L., Gen. Pl. ed. 5. 342. 1754. Since it was first described by Linnaeus the genus *Ascyrum* has included those species having a tetramerous calyx and corolla, with two unequal pairs of sepals. The large genus *Hypericum* has long included those species with pentamerous corolla and calyx. Apparently the first author to challenge this classification was Crantz (1766) who transferred the *Ascyrum* species to the larger genus. Later authors, however, maintained *Ascyrum* as a distinct genus. During the past sixty years several taxonomists have questioned this segregation but, with the exception of Keller (1895), no one has attempted to revise the traditional classification. Coulter, in his treatment of the *Hypericaceae* for the *Synoptical Flora of North America* (1897), stated: "The propriety of a generic separation from *Hypericum* is very doubtful." In 1895 Keller treated *Ascyrum* as a section of *Hypericum*. Thirty years later, however, Keller (1925) reconsidered the problem and gave *Ascyrum* generic status but apparently with some misgivings for he remarked: "Die Gattung ist jedenfalls nur künstlich von *Hypericum* zu trennen." Recently, in a revision of the *Ascyrum* species by Adams (1957), the question was briefly discussed but it was decided to treat the species as members of *Ascyrum* until the closely related species of *Crookea* and *Hypericum* § *Myriandra* could be studied.

EVIDENCE FOR A MERGER OF ASCYRUM WITH HYPERICUM

THE FLOWER. The tetramerous calyx and corolla, characters which have been traditionally used to distinguish *Ascyrum* as a genus, occur not infrequently in many *Hypericum* species. In § *Myriandra*, 4-parted flowers have been observed in *H. ellipticum* Hook., *H. myrtifolium* Lam. and *H. galioides* Lam. and doubtless occur occasionally in other species. According to Milne-Redhead (1953), 4 sepals and

petals may sometimes be found in the African *H. kiboense* Oliv. (§ *Humifusoideum*). Tetramery appears to be the normal condition in *H. filicaule* Dyer ex Hook. f. a species of *Hypericum* from the Sikkim Himalaya which Dyer considered to belong to *Ascyrum*. Robson (1956), however, showed it to be closely related to other Himalayan species in that section.

Flowers with pentamerous corollas, a characteristic which has been long used to separate *Hypericum* from *Ascyrum*, occur in *Ascyrum pumilum* Michx. Pentasepalous flowers have not yet been observed in *Ascyrum* although they occur not infrequently in *Crookea* (see below).

The genus *Ascyrum* has been further characterized by the presence of two unequal pairs of sepals. This condition is not uncommon in many species of *Hypericum* in which the sepals are unequal because of their quincuncial development. The first (or exterior) two are almost opposite and more or less equal, the third (with one margin exterior and the other interior) is smaller, and the fourth and fifth sepals (or interior ones) are smaller still and nearly equal in size and shape. Unequal sepals are characteristic of *H. macrosepalum* Rehder, *H. humifusum* L., *H. androsaemum* L., *H. filicaule*, and several species in *Hypericum* § *Myriandra*.

Floral characteristics common to *Ascyrum* and certain species of *Hypericum* include: persistent sepals and stamens; short to long styles; minute stigmas; lack of sepal articulation; petals which are yellow, convolute in the bud and usually quickly deciduous; numerous afascicular stamens; versatile anthers which dehisce laterally by longitudinal slits; 3 or 2 carpels; parietal placentation; dry, septical capsule; numerous small seeds; and an inflorescence which is obviously reduced to a single flower from a simple, 3-parted dichasium.

ANATOMY OF THE FLOWER. Except for tetramery, the anatomy of the flower in *Ascyrum* is very similar to that found in various species of *Hypericum* § *Myriandra*. The inner (smaller) sepals have unilacunar (not trilacunar) traces, but this is a common effect of reduction in the width of insertion of a foliage member (Robson, 1956).

VEGETATIVE BODY. In growth habit the species of *Ascyrum* are not unlike various members of *Hypericum* § *Myriandra*. The low, bushy, suffruticose form of *A. pumilum* Michx. and *A. multicaule* Michx. is paralleled by that of *H. buckleyi* S. Wats. The erect, shrubby nature of *A. stans* Michx. and *A. tetrapetalum* (Lam.) Vail is very similar to that of *H. cistifolium* Lam. and *H. myrtifolium* Lam.

Winged stems are present in *Ascyrum* species and occur in practically all sections of the genus *Hypericum*.

In *Ascyrum*, as well as in § *Myriandra* of *Hypericum*, the secretory structures in the leaves, sepals and stems are composed of translucent or pellucid-punctate glands which take the form of dots or vittae (elongate tube-like sacs). The black punctate glands which are typical of such herbaceous species as *H. punctatum* Lam. and *H. perforatum* L. are absent from these groups, however.

The leaves (as well as the sepals) of *Ascyrum* do not have a basal groove or articulation, a feature lacking in its closest relatives among the species of *Hypericum* § *Myriandra* as well. The leaf margin in *Ascyrum* is narrowed abruptly into a thin hyaline zone which is easily seen in living plants but becomes obscure in dried material. This characteristic is also present in several species of *Hypericum* § *Myriandra*.

ANATOMY OF THE STEM. A comparative study of the stem anatomy by Vestal (1937) showed that *Ascyrum* species differ very little, if any, from the woody members of the genus *Hypericum*. Furthermore, Vestal found "a very constant homogeneity" with "no segregation of anatomical groups possible" among the one hundred or more species of *Hypericum* which he studied.

CHROMOSOMES. The haploid number of nine is present in five of the six species of *Ascyrum* for which counts have been made (Adams, 1959). The same haploid number is present in at least eighteen members of *Hypericum* § *Myriandra* (Hoar and Haertl, 1932; Adams, 1959). It has been found also in several species of sections *Hypericum*, and *Triadenioidea*. In size and shape the meiotic chromosomes of *Ascyrum* and of § *Myriandra* are remarkably similar. No detailed karyotype analysis has been attempted on these

species, however.

GEOGRAPHIC DISTRIBUTION. *Ascyrum* and its closest relatives in *Hypericum* § *Myriandra* are native only in eastern North America, especially the southeastern portion. Moreover, the other members of the section occur only in the same region.

Crookea Small, Fl. Southeastern U. S. 786, 1335. 1903. The single species comprising the genus *Crookea* was first described by Torrey and Gray (1838) as *Ascyrum microsepalum*. That it occupied an anomalous position in this genus was suggested by their remark: "This species differs from all the others of the genus in the somewhat equal and very small sepals, as well as in the long style: it has the habit of *Hypericum*." Many years later Sereno Watson (1878) transferred it to *Hypericum*. Coulter (1897) agreed with Watson, noting that this species showed very close affinity with *Hypericum* in all characteristics except, of course, the tetramerous flowers. In order better to accommodate this rather anomalous species, Small (1903) distinguished the monotypic genus *Crookea*. Later Keller (1925) treated it again as an *Ascyrum*. Recent studies (see below) suggest that both *Crookea* and *Ascyrum* are very closely related to § *Myriandra* of *Hypericum*.

EVIDENCE FOR A MERGER OF CROOKEA WITH HYPERICUM

THE FLOWER. The flowers of *Crookea* are like *Ascyrum* in being tetramerous, but the nearly equal size and shape of its two pairs of sepals are definitely suggestive of *Hypericum*.

Sepal and petal number in *Crookea* are very variable even in flowers on a single plant. Many individual plants may have only 4-parted flowers. Not infrequently, however, plants are found which have typical hypericaceous pentamerous flowers. The same plants may possess flowers which are "intermediate" in sepal and petal number, size, and shape. As regards the total number of perianth parts, flowers with 4 sepals and 5 petals, or 5 sepals and 5 petals have been observed. The sepals and petals of a single flower may differ in size and shape and one or more may be much smaller than the others; not infrequently, two petals or two sepals

may be partially fused, presenting a doubled appearance. A detailed analysis of the flower variation in *Crookea* will be presented by the senior author in a forthcoming taxonomic study of its single species and its relatives in *Hypericum* § *Myriandra*.

All the other floral and vegetative morphological characteristics of *Crookea* occur as well in various *Hypericum* species. These include its low, bushy growth habit, winged stems, translucent secretory glands, numerous small seeds, absence of leaf and sepal articulation, rounded leaf margins, parietal placentation, and a haploid chromosome number of nine.

SUMMARY

To recognize *Crookea*, *Ascyrum* and *Hypericum* as distinct genera appears to us to require the use of rather arbitrary criteria as a means of delimiting these genera. An analysis of the constellation of morphological characteristics common to the species of *Crookea*, *Ascyrum* and certain species of *Hypericum* which suggest close genetic affinity indicates that they should be included in a single genus of which *Crookea* and *Ascyrum* represent extreme evolutionary developments.

The reduction of the genera *Crookea* and *Ascyrum* to *Hypericum* makes necessary the following nomenclatural changes:

Hypericum edisonianum (Small) Adams and Robson, comb. nov. Based on *Ascyrum edisonianum* Small, Man. Southeastern Fl. 868. 1933 [as *Edisonianum*].

Hypericum hypericoides (L.) Crantz, Institut. rei herbariae. 2:520. 1766. *Ascyrum Hypericoides* L., Sp. Pl. 2:788. 1753.

Hypericum microsepalum (T. & G.) Gray ex S. Wats., Biblio. index to N. Am. botany. 1:456. 1878. *Ascyrum microsepalum* T. & G., Fl. N. Am. 1:157. *Crookea microsepala* (T. & G.) Small, Fl. Southeastern U. S. 786, 1335. 1903.

Hypericum suffructicosum Adams and Robson, nom. nov. Based on *Ascyrum pumilum* Michx., Fl. Bor.-Am. 2:77. 1803. *Non Hypericum pumilum* Sesse & Moc., Fl. Mexic. ed. 2:177. 1894 [as *pumillum*].

Hypericum stans (Michx.) Adams and Robson, comb. nov. Based on *Ascyrum stans* Michx., Fl. Bor.-Am. 2:77. 1803.

Hypericum stragulum Adams and Robson, nom. nov. Based on *Ascyrum multicaule* Michx., Fl. Bor.-Am. 2:77. 1803. *Non Hypericum multicaule* Lam., Encyc. 4:178. 1797. *Ascyrum spathulatum* Spach, Hist. Nat. Vég. 5:462. 1836. *Non Hypericum spathulatum* (Spach) Steud., Nomencl. ed 2, 1:789. 1840, which was based on *Myriandra spathulata*.

Hypericum tetrapetalum Lam., Encyc. 4:153. 1797. *Ascyrum tetrapetalum* (Lam.) Vail in Small, Fl. Southeastern U. S. 785. 1903.

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CHROMOSOME NUMBERS OF
SOME BRAZILIAN LEGUMINOSAE¹

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The junior author of this paper spent 5 months during 1958-59 in south-central Brazil collecting *Cassia* material in connection with a doctoral thesis problem. Since he was routinely collecting bud material of various species of this genus and shipping these air mail to the senior author for meiotic examination, he was able to include, as time and opportunity permitted, occasional bud collections of other

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